



SARDAR PATEL UNIVERSITY

B.Sc. Semester – III CBCS (2014 -2017 Batch) (2022 - 2023) Examination

Thursday, 29th September, 2022

Time : 12.30 to 2.30 pm

Statistics

M.Marks : 70

US03CSTA01 (Descriptive Statistics)

Q.1 Multiple Choice Questions (10 × 1)

- 1 The weighted mean of first n natural numbers whose weights are equal to the corresponding number is equal to
 (a) $\frac{n+1}{6}$ (b) $\frac{2n+1}{12}$ (c) $\frac{n^2-1}{12}$ (d) $\frac{2n+1}{3}$
- 2 For a symmetrical distribution all the even order central moments are _____
 (a) ≥ 0 (b) ≤ 0 (c) = 0 (d) Any
- 3 If $n = 10$, $\sum(X_i - 7) = 84$, $\sum(X_i - 7)^2 = 945$, then standard deviation = _____
 (a) 8.94 (b) 94.5 (c) 9.84 (d) 4.89
- 4 Extreme value have no effect on
 (a) Median (b) Harmonic Mean (c) Geometric Mean (d) Arithmetic Mean
- 5 While computing a weighted index number, the current period quantities only are used in the
 (a) Laspeyre's method (b) Paasche's method
 (c) Fisher's method (d) None of the above
- 6 What is the denominator in GFR (General Fertility Rate)
 (a) Married women (b) Married women in reproductive age
 (c) Women in reproductive age (d) All women
- 7 Soham wants to calculate his grade in the subject of statistics. The teacher's policy is that the internal test weight 30%, quizzes 20%, homework 20%, projects 5% and the final examination is 25%. The marks obtained by Soham is given below:

Internal test	Quizzes	Homework	Projects	Final Examination
92	95	100	90	85

What will be his final grade in the class be?

- (a) 92.40 (b) 92.13 (c) 92.26 (d) 92.35
- 8 The base period should be
 (a) abnormal (b) current year (c) normal (d) any year
- 9 Direct method of standardization is used to compare the mortality rates between two countries. This is done because of the difference in
 (a) Causes of death (b) Numerator
 (c) Age distributions (d) Denominator
- 10 A person walks 6 km at 3 km/hour, 5 km at 4 km/hour and 4 km at 3 km/hour. The average speed for the person is
 (a) 3.33 km/hour (b) 5 km/hour (c) 3.27 kmph (d) None of these

Q.2 Fill in the blanks (8 × 1)

- 1 _____ is the geometric mean of Laspeyre's and Paasche's index numbers.
- 2 The number of births per thousand people in the population is _____
- 3 The standard deviation of a distribution is 5. The value of the fourth central moments, in order that the distribution is mesokurtic, should be _____
- 4 The algebraic sum of deviations of a given set of n observations from their _____ is always zero.
- True or False
- 5 Sex ratio means no. of females per 1000 people in the population.
- 6 A distribution with two modes is called bimodal distribution.
- 7 The formula $\frac{\sum p_0 q_1}{\sum p_0 q_0} \times 100$ is used to calculate the Paasche's price index number.
- 8 For a box – and – whisker plot, the box itself represents 75% percent of the observations.

[P.T.O.]

Q.3 Short Type Questions (Attempt Any Ten) (10 × 2)

- 1 With reference to index number, define base year and current year. Write down ideal characteristics of base year.
- 2 Draw Box – plot for the data given below:
18, 27, 34, 52, 54, 59, 82, 37, 93, 83
- 3 In a group of n people, the mean age of men and women is 30 years. If the mean age of x men is 32 and $(n - x)$ women is 27, find the percentage of men and women in the group.
- 4 Write in brief about Specific Death Rate (SDR).
- 5 Explain the concept of (i) positive skewness (ii) negative skewness by sketching suitable diagrams locating measures of central tendency.
- 6 Define Vital statistics. State its uses.
- 7 The first three moments of a distribution about the value 2 are 1, 22 and 10. Find the value of 3rd moment about mean.
- 8 Given that:
$$\sum p_0q_0 = 425, \sum p_0q_1 = 480, \sum p_1q_0 = 500, \sum p_1q_1 = 540$$
Calculate Laspeyre's and Paasche's quantity index numbers.
- 9 The total population of city is 2, 00, 000 and of them 48% are females. Among the females 45% are of child bearing age. If GFR of the city is 32, find the expected no. of children that will born during next year.
- 10 Find the harmonic mean of the numbers $1, \frac{1}{2}, \frac{1}{3}, \dots, \frac{1}{n}$
- 11 Verify whether Laspeyre's formulae satisfy time reversal test or not.
- 12 With reference to box – and – whisker plot, what is an outlier? How will you find an outlier?

Q.4 Long Answer Questions (Attempt Any Four) (4 × 8)

- (1) The daily expenditure of 100 families are given below:

Daily Expenditure(Rs.)	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
No. of families	13	?	27	?	16

If mode of the distribution is 44, calculate Karl-Pearson's coefficient of skewness.

- (2) Calculate an ideal index number from the following data and show that it satisfies both the time reversal and factor reversal test.

Commodity	2020		2021	
	Price	Expenditure	Price	Expenditure
A	8	80	10	120
B	10	120	12	96
C	5	40	5	50
D	4	56	3	60
E	20	100	25	150

- (3) (a) What is the purpose of standardization of a mortality data? Explain the direct and indirect method of standardization.
(b) Prove that the geometric mean of n numbers in G.P is equal to geometric mean of its first and last term.
- (4) Two groups with n_1 and n_2 observations having mean \bar{X}_1 and \bar{X}_2 , standard deviations S_1 and S_2 respectively. Derive the formula for combined variance. Verify the same in each of the following cases:
(i) $\bar{X}_1 = \bar{X}_2$ (ii) $n_1 = n_2$
(iii) $n_1 = n_2$ and $\bar{X}_1 = \bar{X}_2$ (iv) $n_1 = n_2$ and $\bar{X}_1 = \bar{X}_2$ and $S_1 = S_2$
- (5) (a) Prove that the weighted mean of first n natural numbers whose weights are equal to the corresponding number is equal to $\frac{(2n+1)}{3}$

- (b) The sum of squares of deviations is least (minimum) when measured from
 (a) Mean (b) Median (c) Mode (d) All of the above
 Choose most suitable one and prove the same.

- (6) (a) With reference to Vital statistics, explain the following terms:

(i) Infant Mortality Rate (ii) Reproductive age (iii) Total Fertility Rate

(b) Calculate (i) CDR (ii) STDR of population A, using direct and indirect methods.

Age (in years)	Standard population		Population A	
	Population ('000)	ASDR*	Population ('000)	ASDR*
0 - 5	8	50	12	48
5 - 15	10	15	13	14
15 - 50	27	10	15	9
> 50	5	60	10	59

- (7) (a) Namrata wants to buy a new car, and decides on the following rating system:

Appearance 10%, Reliability 40%, Mileage 20% and Comfort 30%.

The Ford car gets 7 (out of 10) for appearance, 6 for reliability, 9 for mileage and 3 for comfort.

Hyundai car gets 4 (out of 10) for appearance, 7 for reliability, 3 mileage and 9 for comfort.

Toyota car gets 7 (out of 10) for appearance, 6 for reliability, 6 for mileage and 5 for comfort.

Which car is best?

(b) The mean and variance of 5 observations are 4.4 and 8.24 respectively. If 3 of the observations are 1, 2 and 6. Find the remaining two observations.

- (8) (a) If Laspeyre's price index is equal to Paasche's index, show that both the index numbers satisfy the factor reversal test.

(b) What is an index number? Why index number are called economic barometer?

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